

# Control of *Blatella Germanica* in a Public Housing Project

ELDEN J. WALLER

**I**N THE SPRING of 1962 the Contra Costa County Housing Authority requested that we investigate their housing project to determine the extent of cockroach infestation in the units. Dr. Basil Markos, senior vector control specialist, bureau of vector control, California State Department of Public Health, had reported an extremely heavy infestation of the cockroach *Blatella germanica* in the 514 existing units.

After inspecting the units, the Contra Costa County Health Department set up a control program to eliminate the infestation of cockroaches in these units and to prevent the cockroaches from transferring to the 267 new units being built by the housing authority and scheduled for occupancy in August and September 1962.

We received assistance in the program from the Contra Costa County probation and social service departments, the California State Department of Public Health, and Bayo Vista Housing.

We first evaluated various procedures (fumigation, residual insecticides, space spray) for chemical control of the cockroach infestation. Certain operations would be troublesome. Most of the units were occupied, and it would not be possible for the tenants to leave them during the treatment. The process could not be lengthy. The spray or powder must not contaminate food or be harmful to human beings. Because of budget limitations the treatment could not be expensive.

Preliminary plans included treatment of

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*Mr. Waller is senior sanitarian, Contra Costa County Health Department, Martinez, Calif.*

every unit in the housing project. Previously, units had been sprayed at the request of the tenant; as a result, the cockroaches from an infested unit had transferred to other units. We decided that individual units could no longer be considered. If one unit in the building was infested, the entire building would have to be treated. We needed assurance that the program would be effective.

The health education division of the department would participate actively by providing leaflets to all tenants advising them of the program and outlining their role in control measures. The nursing division would reinforce the educational efforts by home visits.

An evaluation guide, including the following sections on sanitation and infestation, was used for inspections. Housekeeping and poor storage practices were considered in determining sanitation.

#### *Sanitation*

Good: Garbage and rubbish properly stored and premises clean.

Fair: Storage unsatisfactory and/or possible poor storage of waste.

Poor: Improper storage, dirty.

Bad: No sanitation techniques.

#### *Infestation*

Very heavy: Roaches seen in numbers during the day without critical inspection.

Heavy: Many roaches observed on inspection.

Moderate: Few roaches seen.

Very light: One or two roaches reported in 1 to 2 weeks.

None.

A short training course in the safe use of insecticides for rodent and insect control was provided by the Contra Costa County Health Department for the housing project maintenance

personnel who were to carry out the program. They had not been aware of the potential hazards from indiscriminate use of the insecticides, and we had observed their unsafe handling of concentrated sources of malathion and diazonin.

### Experimental Treatment

For experimental treatment of the cockroaches, we selected a building consisting of seven apartments with heavy infestation. Sanitation in several of the apartments was poor; in others it ranged from fair to good.

Weekly inspections of the building were started in July 1962. The units were treated with sorptive dust, or silica gel (1-4), in the amounts of  $\frac{1}{4}$  to 1 pound of dust per 1,000 square feet of total floor area, in all areas frequented by the cockroaches. During the initial phase, a space spray (pyrethrum-piperonyl butoxide) was used for two reasons: (a) a rapid knockdown spray was indicated and (b) the housing authority already owned a \$1,000 supply of this spray. We advised tenants to leave the dust in cabinets, under stoves, refrigerators, and other appliances, and in the walls. (Dust accidentally dampened need not be replaced.)

The tenants resisted considerably at the onset of the treatment. Silica gel has a slow killing action and is not toxic while it works chemically to cause dehydration and death. We could not show any dramatic action, such as rapid death of the cockroach. The value of silica gel is that it is extremely light and invasive and will filter through the walls. It is not rendered ineffective with time, and no reapplication is necessary. However, the tenants did not appreciate the long-term, continuous aspects of the program. Tenants of apartments that had a heavy infestation of cockroaches when reinspected were given the choice of cooperation or citation or eviction if they could not control the cockroaches themselves.

The slight decrease in the cockroach population in the experimental building, as a result of treatment with silica gel alone, was not commensurate with our efforts or the goals desired. The more common residual insecticides such as malathion and diazonin kill quickly but their residual effects are lost after a few weeks. Repeated applications are necessary, which add

to the cost. We decided to use both malathion and silica gel, the malathion to take care of the acute phase and the silica gel for long-term prevention and control of the cockroaches. (When our supply of malathion was exhausted, diazonin was used.)

Sorptive dust (silica gel) was sprayed into walls, ceilings, cracks, and shelves of the experimental building through drill holes in the kitchen areas of all units. A 2 to 3 percent emulsion of malathion was applied with a small paint brush in inaccessible places, such as behind stoves, refrigerators, water heaters, and under sinks.

Sorptive dust also was sprayed in the bathroom areas, in cracks and crevices, holes in the wall, and under the floor covering. Heavy application of the dust is not necessary. (Many tenants tended to remove the dust when it was applied excessively.)

Care had to be taken so that the malathion spray did not permeate the room. It should be used only above the height or reach of small children.

The cockroach infestation, which was heavy in most of the units at the beginning of the experiment, decreased markedly after our final treatment. Sanitation in the units did not seem to be a factor, as it was only slightly improved at the end of the procedure (5).

Comprehensive treatment with the rapid-killing agent malathion or diazonin and the long-term preventive product silica gel was recommended for the actual control program because we had achieved control of the cockroaches with the use of these insecticides in our experimental program.

The experimental building was not treated with residual insecticides after September 26, 1962. The building was reinspected in June 1963, and no cockroaches were found.

### Control Program

We started the actual control program a little more than a month before completing our experimental procedure. Ninety-two buildings, or a total of 514 dwelling units, were treated for control of the cockroach *B. germanica* during our first inspection of units between August 15 and September 19, 1962

**Table 1. Evaluation of units in Contra Costa County Housing Authority project treated for control of *Blatella germanica***

Number of buildings and date of inspection	Sanitation						Infestation					
	Bad	Per-cent	Fair-poor	Per-cent	Good	Per-cent	Heavy	Per-cent	Light	Per-cent	None	Per-cent
92, between Aug. 15-Sept. 19, 1962.....	15	16	45	49	32	35	23	25	61	66	8	9
92, October 1962.....	11	12	42	46	39	42	18	20	61	66	13	14
25, November 1962.....	12	48	9	36	4	16	7	28	10	40	8	32
38, June 1963.....	4	11	21	55	13	34	0	-----	0	-----	38	100
11, September 1964.....	1	9	4	36	6	55	0	-----	0	-----	11	100

(table 1). Silica gel and malathion were used in combination. The second inspection and treatment were started September 26. In November all the buildings with heavy infestations of cockroaches were reinspected and re-treated.

In the original inspection, 95 percent of the units were infested with cockroaches; on second inspection, 91 percent; and on third, 75 percent.

The use of malathion was discontinued in February 1963, and sorptive dust alone was used thereafter. No visual evidence of cockroaches was found in any of the units on the fourth inspection in June 1963, and no visual evidence or history of cockroaches was noted on the fifth inspection, when 11 occupied buildings were re-evaluated, in September 1964.

The space spray (pyrethrum-piperonyl butoxide) used during the early stages of the program was still being used in the vacant units in late 1962.

**Cost of Program**

The use of space spray was 3½ times more expensive than our method of control and had no residual effect. One-half gallon of space spray cost \$2.50 for each unit, and labor was \$1.25. Total cost per unit was \$3.75. Total cost for 275 units was \$1,031.25 (table 2).

For a less intensive (kitchens only) treatment of the units, silica gel cost 10 cents per unit, malathion or diazinon, 5 cents per unit, and labor, 30 cents per unit, or a total of 45 cents per unit. Four hundred and fifty occupied units were treated twice at a cost of \$405.

The intensive treatment covered the whole apartment. The estimated cost of treating 250 new units with silica gel before occupancy, as a preventive measure, was \$112.50, or 45 cents per unit. The cost of treating both new and old units for a 6-month period was \$1,548.75.

Costs for the final control program were much

**Table 2. Cost of inspecting and treating Contra Costa County Housing Authority project for control of *Blatella germanica***

Inspection No. <sup>1</sup>	Number units	Space spray	Silica gel	Malathion	Labor	Cost per unit	Total cost
1.....	275	\$2.50	-----	-----	\$1.25	\$3.75	\$1,031.25
2.....	900	-----	\$0.10	\$0.05	.30	.45	405.00
3.....	250	-----	.15	-----	.30	.45	112.50
4.....	514	-----	.20	.11	.50	2.81	( <sup>2</sup> )

<sup>1</sup> Inspection 1, space spray only used; 2, less intensive treatment; 3, silica gel only in pretreatment; 4, final intensive treatment.

<sup>2</sup> Total cost per unit, treatment plus contingencies, less than \$1.

lower. The total cost for intensive treatment per apartment, including labor, was less than 82 cents. Adding contingency costs of 18 cents to the final combined program cost made the total less than \$1 per unit.

The cost of the Contra Costa cockroach control program compares favorably with the total cost (estimated at \$1 per unit) of a San Francisco Housing Authority program to control the cockroach.

### Discussion

The major objective of a Los Angeles County program was the elimination or effective control of an insect that is both a nuisance and a potential public health problem; that is, hepatitis in relation to cockroach incidence in a public housing project in southern California.

Though occupying only one-tenth of a square mile of the 50-square-mile Bellflower health area of Los Angeles County, Calif., the 712-unit, low-rent Carmelitos housing project at Long Beach, between 1956 and 1959, had 20 to 39 percent of all the cases of infectious hepatitis in the area. In 1960 the incidence of this infection dropped at the housing project to 6.6 percent, in 1961 to 3.6 percent, and in 1962 to zero; at the same time the incidence increased everywhere else in Los Angeles County. It was found that the incidence of this disease decreased concurrently with an approximate 70 percent reduction in infestations of German, brown-banded, and oriental cockroaches, as a result of a concentrated control program with the silica aerogel insecticide Dri-Die 67(6).

### Summary and Conclusions

A 95 percent infestation of the cockroach *Blattella germanica* in a housing project of the Contra Costa County Housing Authority, California, was reduced to nearly zero infestation after 24 months of control measures, despite a general lack of improvement in sanitation of the

premises. As of June 1963 the transfer of cockroaches from old to new units was adequately prevented, and control of the heavy infestation of *B. germanica* was accomplished.

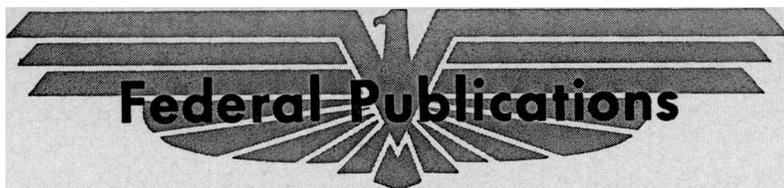
With contingency expense of 18 cents added to final combined program costs, the expense per unit was less than \$1.

Personnel for a program such as that at the housing authority project require training in the safe handling of insecticides.

Because of the slow killing action of silica gel alone, a residual insecticide such as malathion or diazinon must be used initially for heavy infestation to obtain rapid reduction in the number of cockroaches. After discontinuing the use of residual insecticides for a period of 18 months, effective control was achieved with the use of silica gel alone. The use of silica gel gives effective control of the cockroach in a long-term preventive program. A heavy infestation of cockroaches can be reduced drastically by intensive treatment even though sanitation remains poor.

### REFERENCES

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- (2) University of California: Control of household insects and related pests. Circular No. 489. Berkeley, Calif., April 1961, pp. 16-18.
- (3) U.S. Department of Agriculture: Cockroaches: How to control them. Leaflet No. 430. U.S. Government Printing Office, Washington, D.C., 1958.
- (4) U.S. Public Health Services: Pesticides: Pest control. PHS Publication No. 1081 (Health Information Series No. 112). U.S. Government Printing Office, Washington, D.C., 1961.
- (5) Waller, E. J.: Statistical report of inspections to the Contra Costa County Health Department. Martinez, Calif., September 1964. Mimeographed.
- (6) Tarshis, I.: The cockroach: A new suspect in the spread of infectious hepatitis. *Amer J Trop Med* 11: 705-711, September 1962.



**Patients and Personnel Speak.** *PHS Publication No. 527; 1964; by Faye G. Abdellah and Eugene Levine; 40 pages; 35 cents.* Revises an illustrated manual for helping hospitals conduct a 1-day study to determine how well hospital patients and hospital medical personnel are satisfied with nursing services. Provides separate checklists for collecting information from patients and personnel and instructions for tabulating and analyzing study data. Incorporates methodology for scoring the checklists, data to help hospitals compare their satisfaction scores with those of other hospitals, and a bibliography.

**Community Emergency Health Preparedness.** *PHS Publication No. 1071-A-2; 1964; 20 pages.* Summary guide for planning, developing, and implementing community health service. Indicates sources for professional leadership and gives specific recommendations for coordination with all other essential services. Includes references for outside assistance from State, Federal, professional, and other sources.

**An Emanation System for Determining Small Quantities of Radium-226.** *PHS Publication No. 999-RH-9; 1964; by Richard L. Blanchard; 19 pages.* Gives a detailed account of the construction, operation, and characteristics of an emanation system for the determination of radium 226. The method is specific for radium 226, well suited for large-volume samples containing small quantities of this nuclide, and will accommodate any type of sample that can be prepared in an aqueous solution. The limit of detection at the 95 percent confidence level was calculated to be 0.016 picograms of radium 226, and the transfer and collection of radon 222 was determined to be 100 percent with an average deviation of 3 percent.

**An Environmental Surveillance Laboratory for Radionuclide Analyses.** *PHS Publication No. 999-R-7; 1964; by Edmond J. Baratta, Donald C. Parks, Dade W. Moeller, and Marvin Rosenstein; 37 pages plus appendix.* Describes planning, establishment, and operation of a Public Health Service laboratory for radiation measurement and surveillance. Discusses facilities, personnel, and equipment in relation to analytical capacities. Includes separate section which discusses techniques and operational factors in handling large numbers of milk samples for analysis of fission product activity.

**Health Statistics From the U.S. National Health Survey.** **National Center for Health Statistics.**

**ACUTE CONDITIONS, INCIDENCE AND ASSOCIATED DISABILITY,** United States, July 1962-June 1963. *PHS Publication No. 1000, Series 10, No. 10; June 1964; 66 pages; 45 cents.*

**HEALTH INSURANCE COVERAGE,** United States, July 1962-June 1963. *PHS Publication No. 1000, Series 10, No. 11; August 1964, 37 pages; 35 cents.*

**BED DISABILITY AMONG THE CHRONICALLY LIMITED,** United States, July 1957-June 1961. *PHS Publication No. 1000, Series 10, No. 12; September 1964; 62 pages; 45 cents.*

**BINOCULAR VISUAL ACUITY OF ADULTS,** United States, 1960-1962. *PHS Publication No. 1000, Series 11, No. 3; June 1964; 27 pages; 25 cents.*

**BLOOD PRESSURE OF ADULTS BY AGE AND SEX,** United States, 1960-1962. *PHS Publication No. 1000, Series 11, No. 4; June 1964; 40 pages; 35 cents.*

**Sources of Morbidity Data. Listing No. 11.** *PHS Publication No. 1251; 1964; 86 pages.* Describes 86 projects not previously listed. Includes projects of illness and disease

grouped according to disease category; projects concerned with dental conditions, injuries, and physical impairments; and a few studies of health economics and medical care. A section of supplementary notes gives addenda on projects described in previous listings. Publication should be of special interest to research workers and persons planning public health programs.

**Hospital Administrative Research.** *PHS Publication No. 930-C-8; June 1964; 48 pages; 35 cents.* Discusses the function of hospital research, particularly as it relates to administration. Describes some of the activities of the Hill-Burton program which contribute to such research. Includes a list of Hill-Burton sponsored research and demonstration projects and resulting publications.

**How To Study Nursing Activities in a Patient Unit.** *PHS Publication No. 307; revised 1964; 142 pages; \$1.25.* Describes an intermittent sampling method developed by the Division of Nursing to help hospitals study the activities of all levels of personnel assigned to inpatient units. By showing the proportion of time each level of personnel spends in various activities, the study findings help hospitals to reassign staff to make the best use of professional nurse time. Revision incorporates simplified coding and statistical procedures and contains sample worktables which the hospital can remove from the book and duplicate.

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